

Amendments to the Drawings:

This sheet replaces the original Figure 1-10. Formals drawings are submitted herewith under separate Letter to the Draftsperson which incorporate the changes required by the Examiner. Approval by the Examiner is respectfully requested.

Attachment: Replacement Figure 1-10

REMARKS

Claims 1-26 were pending in the application. Claims 1-26 stand rejected. Claims 1 and 26 were amended. Claims 27-33 were added. Claims 1-33 remain in the application.

The drawings filed on December 10, 2001 were objected to by the examiner. Replacement drawings have been submitted herewith.

It is understood that the application was examined and that the inclusion of a second conflicting due date within the office action was inadvertent.

A Supplemental Information Disclosure Statement, and PTO-1449 have been submitted herewith.

Claims 1-13, 15, 17, 19-21, and 23-26 stand rejected under 35 U.S.C. 102(b) as being anticipated by Savakis et al. (US Patent 6,738,494 B1; hereafter "Savakis"). Claim 14 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Savakis et al. in view of Yu et al. (6,636,645 B1). Claim 16 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Savakis et al. in view of Malah (US Pub. No.: US 2003/0093279 A1). Claim 22 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Savakis et al. in view of Kato (US Patent 6,665,446 B1).

The Office Action omits a specific rejection of Claim 18 and only states: "Claim 18 was addressed in claims 9-14." To further prosecution, this has been addressed as a rejection of Claim 18 under 35 U.S.C. 103(a) as being unpatentable over Savakis et al. in view of Yu et al. (6,636,645 B1) based upon the positions presented in relation to Claims 9-14.

Claim 1 has been amended to state:

1. A method for processing a digital image, comprising the steps of:
 - a) providing a subject matter detector for distinguishing between target and background subject matters;
 - b) applying the subject matter detector to the image to produce a belief map of values indicating the degree of belief that pixels in the image belong to target subject matter;
 - c) providing an image enhancement operation that is responsive to a control signal for controlling the degree of image enhancement; and

d) applying image enhancement operation to the digital image by varying the control signal pixel by pixel according to the belief map to produce an enhanced image.

Amended Claim 1 is supported by the application as filed, notably, the original claims and at page 6, line 18 to page 7, line 9; page 10, line 29 to page 11, line 8; page 4, lines 2-11; page 11, lines 10-15; page 14, lines 12-14; page 16, lines 1-3; page 16, lines 20-23; (also see page 11, line 10 to page 20, line 12 generally). Claim 1 was broadened by removal of "color".

In Claim 1, unlike Savakis, the belief map for an image has multiple values. Claim 1 requires applying the subject matter detector to produce a belief map of values indicating the degree of belief that pixels of the image belong to target subject matter and applying the image enhancement operation by varying the control signal pixel by pixel according to the belief map. In Savakis, what the rejection calls a "belief map" (output of Fig. 12, number 10) consists of a single value per image. Savakis states:

"Referring first to FIG. 1, an image assessment network 10 for computing an emphasis value is shown to comprise two stages: a feature extraction stage 12 and a classification stage 14." (Savakis, col. 11, lines 48-51)

"The outputs of the feature extraction stage 12 thus represent statistical evidence of the presence (or absence) of certain features; the outputs are then integrated by the classification stage 14 to compute an emphasis value." (Savakis, col. 11, lines 54-58; emphasis added; the abstract; col. 2, line 36 to col. 3, line 56; and col. 9, lines 7-60; see also the definition of "emphasis value"--col. 12, lines 33-36; Savakis likewise has a single appeal value for an image--Savakis, col. 12, lines 46-52)

Claim 1 requires a belief map of values indicating the degree of belief that pixels in the image belong to target subject matter. Savakis discloses emphasis values and appeal values that are determined from features of an ensemble by integrating the features using a Bayes net or other reasoning engine. (Savakis, col. 20, lines 24-25; col. 21, lines 47-49) The resulting image appeal value is not simply representative of a particular feature, since features than target subject matter are also important to the determination of image appeal value in Savakis. For example,

"Good composition is a very important positive attribute of picture emphasis and bad composition is the most commonly mentioned negative attribute." (Savakis, col. 16, lines 63-65; also see Fig. 2, num. 30)

Effect of different features upon the emphasis or appeal values in Savakis, is complex and requires use of a Bayes net or other reasoning engine:

"different evidences may compete with or contradict each other. On the other hand, different evidences may mutually reinforce each other according to prior models or knowledge of typical photographic scenes. Both competition and reinforcement are resolved by the Bayes net-based inference engine." (Savakis, col. 20, lines 25-30; also see Savakis, col. 20, lines 24-25; col. 21, lines 47-49)

unlike Claim 1, in which map values indicate the degree of belief that pixels in the image belong to target subject matter.

Claim 1 in applying image enhancement to the digital image varies the control signal pixel by pixel according to the belief map. In Savakis, the image processing attribute value designates image processing for an entire image:

"... the p_j term refers to image processing attribute value of the j^{th} digital image of the group of digital images." (Savakis, col. 8, lines 60-61; also see col. 8, lines 55-59)

"A method for varying the image processing path for a digital image involves the steps of (a) computing an image processing attribute value for the digital image based on the degree of importance, interest or attractiveness of the image; and (b) using the image processing attribute value to control the image processing path for the image." (Savakis, abstract; emphasis added; also see col. 8, line 55-line 67; abstract; also see the discussion at col. 2, line 36 to col. 3, line 56 and col. 9, lines 7-60)

Claims 2-25 depend from Claim 1 and are allowable on that basis. Claim 22 was broadened by removing "color".

Claim 26 is supported and allowable on the same basis as Claim 1. In Claim 26, the term "for" was removed in two places as being unnecessary and potentially narrowing.

Added Claim 27 states:

27. The method of claim 1 wherein said values indicate more than two different degrees of belief that respective pixels in the image belong to target subject matter.

Claim 27 is supported by the application as filed, notably, the original claims and at page 6, lines 24-29. Claim 27 is allowable as depending from Claim 26.

Claim 28 states:

28. A method for processing a digital image, comprising the steps of:

automatically assigning one of three or more different belief values to each of the pixels of the image, said belief values each indicating the degree of belief that the respective pixel in the image belongs to target subject matter; and

automatically enhancing each of the pixels of the digital image to produce an enhanced image, said enhancing varying in degree, pixel by pixel, in accordance with respective said belief values.


Claim 28 is supported by the application as filed, notably, the original claims and as listed above in relation to Claims 1 and 27. Claim 28 is allowable on grounds like those discussed above in relation to Claim 1. Claim 28 requires automatic assignment of target subject matter belief values to each pixel and automatic enhancement of the digital image in accordance with those values. This is not disclosed by Savakis, by itself or in combination with the other cited references. Savakis, as noted above, assigns a "belief map" of a single value to an entire image and provides a single value that controls the image processing path for the image.

Claims 29-33 are allowable as depending from Claim 28 and are supported by the application as filed, notably, Claim 29-page 9, lines 23-30; Claim 30-original Claims 1 and 23-24; Claim 31-original Claims 1-2; Claim 32-original Claim 22; Claim 32-original Claims 1 and 3.

It is believed that these changes now make the claims clear and definite and, if there are any problems with these changes, Applicants' attorney would appreciate a telephone call.

In view of the foregoing, it is believed none of the references, taken singly or in combination, disclose the claimed invention. Accordingly, this application is believed to be in condition for allowance, the notice of which is respectfully requested.

Respectfully submitted,



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Enclosures: Replacement Figures 1-10
Letter to the Draftsperson
Copies of Formal Drawings
Supplemental IDS, Supplemental PTO-1449
Copy of Cited Reference
Request for One Month Extension of Time